

Another phase of our work has to do with aid given to students of pathological problems. During the year we have had seven of these, who have come to us from the United States, Canada and Europe.

The investigational activities for the year have been varied and substantial progress can be reported on several of the projects undertaken. Naturally the number of subjects under investigation at one time is limited, not by the number that call for research, but by man power and financial support. We have received heartiest co-operation from the Supervisor and some material aid from outside. A summary of the more important topics follows.

1. DISEASES OF CONIFERS. Several weeks were spent in the forest on a study of trunk diseases of Spruce, their causes, their relative frequency of occurrence, relation to age of the trees, the conditions that under-lie their spread, closer utilization and control. Investigations on these and certain other coniferous diseases have been continued in the laboratory.

2. ELM DISEASES. Dr. Christine Buisman of Holland, who, as reported last year, first positively identified the occurrence of the Dutch Elm disease in America, studied various native diseases of Elms while at the Arboretum. Certain results of her work are recorded in this number of the Journal of the Arnold Arboretum.

3. GRAFT BLIGHT OF LILACS. An important part of Dr. K. S. Chester's work on this disease was completed during the year. He was able to demonstrate the cause as involved in the common practice of propagation of Lilacs on privet stocks, a practice that has arisen, not through necessity but because of its somewhat lower cost. His work is bound to be a valuable aid to the lilac industry and to private growers. (K. S. CHESTER, Graft-Blight: A Disease of Lilac Related to the Employment of Certain Understocks in Propagation. *Jour. Arnold Arboretum*, XII. 79-146. 1931.)

4. STUDIES ON GANODERMA. The greatest confusion has prevailed with reference to the taxonomy of a group of wood-attacking fungi, on both hardwoods and softwoods, of the genus *Ganoderma*. An excellent piece of work by W. R. Haddow, based on a comparative study of distinctive characters has revealed what appears to be the key to a correct understanding of the species concerned. (W. R. HADDOW, Studies in Ganoderma. *Jour. Arnold Arboretum*, XII, 25-46. 1931.)

5. AN EPIDEMIC OF BEECH. The devastating epidemic on Beech in Nova Scotia has spread across the border into New Brunswick. Mr. John Ehrlich has begun his second year of study on this disease and finds that it results from a joint attack of a Coccus insect and

a *Nectria* fungus. The Coccus has been found by him in metropolitan Boston. His studies, not yet completed, afford interesting information as to cause and spread, and data on the matter of control.

6. THE NEEDLE CAST FUNGI OF CONIFERS. Dr. G. D. Darker has now assembled his work on the morphology and the biology of the needle cast fungi of conifers. The number of known species (about 50) is doubled and a good beginning made on a study of life histories. It is anticipated that the publication will be issued soon from the Arboretum in monographic form.—J. H. F.

Cytology Laboratory.—Cytological investigations of chromosome numbers in various families of plants have been continued during the year ended June 30, 1931. In certain groups, such as the Pomoideae, the chromosome numbers are closely correlated with the taxonomic grouping. In the Pomoideae cytological studies have given us considerable information concerning the origin and relationships of different genera and species. Chromosome numbers have also been obtained from representative genera and species of the Oleaceae, Berberidaceae, Cornaceae, Saxifragaceae, and from a number of isolated genera.

Considerable work has also been done on chromosome structure and behavior in relation to the mechanism of heredity. One paper has been completed on chromosome behavior in *Rhoeo*, based on material collected at the Harvard Botanic Garden, Soledad, Cuba. This paper has been sent to a Japanese journal for publication. Another long paper on chromosome structure is practically completed, also based on preparations made in Cuba in 1930. Mr. Dermen has published a paper on chromosome pairing in polyploids, and a paper on the mechanism of chromosome pairing by Mr. O'Mara has been sent to *CYTOLOGIA* for publication.

The breeding work was conducted on a large scale last spring and about 200 crosses were made between different species and varieties of ornamental shrubs and trees. Many of these crosses were successful. Earlier breeding work has produced a hybrid of unusual interest,—a cross between *Syringa pinnatifolia* and *S. oblata*. Similar hybrids of spontaneous origin have also been found in the nursery by Mr. Judd.—K. S.

The Herbarium.—The Herbarium contains 348,603 specimens, 15,234 having been added between July 1, 1930 and June 30, 1931. Of accessions approximately 1,600 represent plants that are natives of the United States and Canada, 4100 that are natives of Central and South America, 2500 that are natives of China, 1250 that are

natives of Southern Asia and Malaysia, 800 that are natives of Europe and Western and Central Asia, 1000 that are natives of Africa and 1500 that are natives of Australasia. About 1000 of the accessions represent cultivated plants.

Among the more important collections received during the year are the following: 1700 specimens collected by J. G. Jack in Cuba including cultivated plants from the Harvard Botanic Garden near Cienfuegos, 900 numbers with duplicates collected by Mrs. Susan Delano McKelvey, chiefly in Arizona, New Mexico and Texas; about 3000 numbers with duplicates collected in the northwestern and southeastern states by E. J. Palmer; about 700 specimens of Central and South American plants, chiefly collected by Ekman and Dusén (by exchange from the Botanical Museum at Stockholm); approximately 500 specimens from Haiti collected by Leonard; about 450 plants from British Honduras collected by Schipp; 150 plants from Venezuela collected by Pittier; about 200 Mexican plants collected by Purpus; about 650 Kwangtung plants received from the Sun Yatsen University; about 800 specimens of Kwangsi plants collected by Ching from the Metropolitan Museum in Nanking; about 800 numbers with many duplicates of Shantung plants collected by C. Y. Chiao from Nanking University; about 200 plants collected by Liu in Chili; about 175 plants collected by Rock in Szechuan; about 150 Japanese plants collected by T. Tanaka; about 250 Himalayan plants from the Forestry Institute at Dehra Dun; about 300 plants with many duplicates collected by Bornmueller in Asia Minor; about 150 plants of Central Asia from the University of Tashkent; about 700 plants from Madagascar and East Africa with duplicates collected by H. Humbert; about 200 Kamerun plants collected by Mildbraed; about 1200 specimens from New Caledonia collected by I. Franc, and a large collection made by Kajewski in the Solomon Islands.

To the fruit collection 214 specimens have been added bringing the number of fruit specimens to 7251.

The wood collection contains 2282 specimens, 106 having been added during the year.

To the collection of negatives of types and other herbarium specimens 540 negatives were added during the year 512 of these representing types of Chinese plants photographed by Alfred Rehder in European herbaria. The collection now contains 1766 plates and films.

Besides the constant use of the herbarium by the staff in the determination of plants sent in for identification and in the determination of some large collections chiefly from Eastern Asia

and North America, the facilities of the herbarium have been used by members of other departments of the University and by representatives of other institutions. Dr. F. P. Metcalf of Lignan University, Canton, who is preparing a flora of Fukien and E. H. Walker of the National Herbarium in Washington, who is working on a revision of the Chinese Myrsinaceae have depended largely on our collections in the prosecution of their work.

For study outside the Arboretum 368 specimens were sent out on loan to 16 institutions and individuals.

There have been distributed 25,424 specimens to 46 institutions in the United States, Canada, Europe, Asia, Africa and Australia.

Botanical explorations by members of the staff or expeditions partly financed by the Arnold Arboretum have been carried on in different parts of the world. Since March 1930 Mr. S. F. Kajewski has been collecting in the Solomon Islands spending his time during 1930 on Bougainville Island, the largest of the group; he has been very productive and we have already received a large amount of material. Professor C. Y. Chiao returned in September 1930 from the expedition to Shantung mentioned in the report for 1929-30, and this year he expected to start, toward the end of June, with Professor A. N. Steward for the province of Kweichou. Mr. R. Goerz from the beginning of April to the beginning of August undertook a collecting tour into northern Asia Minor primarily for the study of the Willows of that region. From the beginning of April to the beginning of June Mrs. Susan Delano McKelvey collected chiefly in the southwestern United States, obtaining approximately 900 numbers with duplicates. She gave special attention to the species of *Yucca*, *Nolina* and *Agave* and visited most of their type localities; in addition to ample herbarium material representing these genera, she collected 84 numbers of flowers and fruits in formaldehyde and took about 100 excellent photographs. Professor J. G. Jack spent the month of July 1930 and the month of March 1931 in Cuba continuing his botanical explorations in the vicinity of the Harvard Botanic Garden near Cienfuegos. Mr. E. J. Palmer collected from the middle of June to the beginning of September 1930 in the northwestern United States and from the end of March to the middle of June in the southeastern United States as far west as Oklahoma, paying particular attention to the species of *Crataegus*. Mr. Alfred Rehder spent the summer from the end of June to the middle of September in Europe where he attended the International Congress of Horticulture in London as a member of the International Committee on Horticultural Nomenclature. He also attended the

International Botanical Congress in Cambridge. At the meeting in Cambridge he participated chiefly in the sessions of the Subsection on Botanical Nomenclature. Most of the proposals he had submitted for changes in the present rules were accepted and he was appointed a member of the Executive Committee of the Subsection on Botanical Nomenclature and of the Special Committee on Phanerogams and Pteridophytes. He also visited the herbaria of Kew, the British Museum, Paris, Berlin, Breslau and Vienna where he examined and took photographs of over 500 types of Chinese plants.—A. R.

The Library.—During the past year there have been added to the Library 688 volumes, 215 pamphlets and 965 photographs, the total number at the end of June being 39,770 bound volumes, 9,680 pamphlets and 16,465 photographs. Many of the photographs have been received by gift, about 100 by purchase, while the larger number were taken for the Arboretum, either in the Arboretum or in the Middle- or South-west. The remaining unidentified photographs taken by Mrs. Anita G. Curtis in Africa, have been named and placed in the files. A few portraits of well-known botanists and horticulturists have been received in exchange for those of botanists on the Arboretum staff.

Several new periodicals are received in exchange for the "Journal of the Arnold Arboretum" and the "Arnold Arboretum Bulletin of Popular Information," among which are:

- HIROSHIMA UNIVERSITY. Journal of science. Series B, div. ii.
 Vol. i, art. 1 → Hiroshima. [1930] →
 BRITTONIA. Vol. i, no. 1 → New York. 1931 →
 LINGNAN UNIVERSITY, *Canton, China*. Science bulletin, no. 1 →
 Canton. 1930 →
 ROSEN-ZEITUNG; zeitschrift des Vereins deutscher rosenfreunde.
 Jahrg. 46, no. 1 → Sangerhausen. 1930 →
 SUNYATSENIA. Vol. i, no. 1 → Canton. 1930 →
 LA TERRE ET LA VIE. No. 1 → Paris. 1931 →
 TROPICAL HORTICULTURE. Vol. i, no. 1 → Taihoku. 1931 →

A new collection in the Library is that of lantern slides, of which 320 were made from Dr. E. H. Wilson's photographs taken in China and Japan, 844 were the gift of Prof. J. G. Jack and 244 were received from Mrs. George L. Slate, making a total of 1,408. These lantern slides have been catalogued.

More than 1,239 cards were filed in the catalogue of the Library and 1,600 slips were prepared for the supplement to the printed catalogue, which is now in the hands of the printer. To the cata-

logue of photographs 1,000 cards were added during the year and 4,889 cards were placed in the "Card-index of new genera, species and varieties published by the Gray Herbarium." To the manuscript "Index of illustrations and of new genera, species and varieties of ligneous plants published since 1915," prepared at the Arboretum, 4,040 cards have been added giving a total at the end of June of 88,912.

Four hundred and twenty-five books, including periodicals, have been bound.

Thirty-two shelves have been added to the periodical section, necessitating re-arrangement and the entire re-numbering of that section. Twelve steel filing units have been purchased to replace old stacks and pamphlets and nursery catalogues transferred to them and re-arranged.

For want of sufficient space many of the books of travel were moved and re-arranged, as were also the Japanese floras and periodicals. Approximately 1,000 of the more valuable old leather bindings, including many folios, have been lubricated and re-touched, restoring their former beauty and protecting them against further injury.

Among the more important accessions of the year are:

CHAMBERS, William. A dissertation on oriental gardening. [With] an explanatory discourse by Tan Chet-qua. 2d ed. London. 1773.

HERBARUS [sic] zu teütsch und von aller hand kreüttern. Augspurg. 1502.—Woodcuts colored by a contemporary hand.

GREW, Nehemiah. Anatomie des plantes. Paris. 1675.

CHELLINI, Tommaso. Libro d'erbe dipinte al naturale. Scandicci. 1737.—Comprises 380 pages of colored drawings and 6 pages of text. Most of the drawings are of herbaceous plants.

SWEERT, Emanuel. Florilegium, tractans de variis floribus et aliis indicis plantis ad vivum delineatum in duabus partibus et quatuor linguis concinnatum. Francofurti. 1615, '14. 110 plates.—Title-page of pt. i bears also the date "1612."

CULLEN, William. A treatise of the materia medica. 2 vol. Edinburgh. 1789.

LINNÉ, Carl von. Berättelse om the inhemska växter, som i brist af sad kunna användas til bröd- och matredning. Stockholm. 1757.

This very rare brochure, in which Linnaeus enumerates the plants suitable for bread-making and food generally, was published in consequence of the failure of the crops in Sweden. Few copies are known to exist beyond those in the libraries

of the British Museum and the Linnean Society, London, and the Library of Congress, Washington.

ANNALEN der forst-und jagd-wissenschaft. Tom. i-v; vi, heft 2. Darmstadt. 1811-21.

MURRAY, Johann Andreas. Prodrromus designationis stirpium gottingensium. Gottingae. 1770.

CHATELAIN, Joan Jacob. Specimen inaugurale de Corallorhiza. [Basiliæ.] 1760.—Reproduced by Merrymount Press, Boston. 1919. Gift of Professor Oakes Ames.

STAPF, Otto. Index londinensis. Vol. iv, v. Oxford. 1930-31.

FERBER, Joh. Eberh. Hortus agerumensis. Holmiæ. 1739.

WICKES, Dean R. Flowers of Peitaiho. Peking. 1925.

NAKAI, Takenoshin. Florula of M't. Paik-tu-san. Seoul. 1918. —Gift of the author.

[RUIZ LOPEZ, Hipolito. Flora peruviana, et chilensis. Auctoribus Hippolyto Ruiz et Josepho Pavon. Twenty-eight unpublished plates of twenty-nine American species of *Laurus*.] N. P. [1802.] f^o.—These unnumbered plates, cited as "Laurographia," were prepared for a 4th volume of "Flora peruviana, et chilensis" which was never issued. The Arnold Arboretum copy is the only known copy of the original plates in this country. On the inside of the cover is written in a fine hand "Laurographia devoué pour Monsieur le Respectable Palassou, par son passionné, M^r. J. Pavon. Offert à M. le Professeur De Candolle par son ami Léon Dufour."

AN ACCURATE description of the cacao-tree. [London. 1673].

DUPPA, Richard. Illustrations of the lotus of the ancients, and tamara of India. London. 1816. f^o.—12 hand-colored plates. "Only twenty-five copies printed."

The MARY ROBESON SARGENT FUND has made possible the purchase of some of the more expensive works.

Through the courtesy of the publishers, the Library has received Dr. E. H. Wilson's "If I were to Make a Garden."¹ Garden lovers everywhere will welcome this last book from the pen of Dr. Wilson. In more than 200 pages and 37 plates he gives a comprehensive picture of the garden of his dreams, loveable and satisfying. The claim of each plant to a place in the garden, its habit and requirements, are carefully noted, and the chapter on Boxwood adds a helpful bit of information for those interested in this historic shrub.

From the LIBRARY OF THE MASSACHUSETTS HORTICULTURAL SOCIETY have come nos. 1-4 of the rare vol. iii. of C. M. HOVEY'S "The fruits of America," [1858?], f^o, 19 colored plates.

¹ If I were to make a garden. By Ernest H. Wilson. Boston, Stratford Company, 1931, 1. 8^o. pp. xvi, 295. Port. and 37 plates.